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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/644,634	08/23/2000	Kanu G. Shah	60680-1407	1464

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EXAMINER

BISSETT, MELANIE D

ART UNIT	PAPER NUMBER
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1711

DATE MAILED: 07/18/2002

3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/644,634

Applicant(s)

SHAH ET AL.

Examiner

Melanie Bagwell-Bissett

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-59 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-40, 42-47, 49-54 and 56-59 is/are rejected.
- 7) ☒ Claim(s) 41, 48 and 55 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Summary of the Independent Claims

1. Claim 1 is drawn to a process for sealing and insulating a fuel cell plate comprising providing a fuel cell plate, applying a coating precursor on a surface of the fuel cell plate, and exposing the coating precursor to radiation or heat.
2. Claim 17 is drawn to a process for sealing and insulating a fuel cell plate comprising providing a fuel cell plate, applying a UV-responsive coating precursor on a surface of the fuel cell plate, and exposing the coating precursor to UV radiation, where the coating precursor includes an acrylated oligomer and a photoinitiator.
3. Claim 22 is drawn to an insulated fuel cell plate comprising a plate and a radiation- or heat-polymerizable coating precursor.
4. Claim 33 is drawn to an insulated fuel cell plate comprising a plate and a coating precursor, where the coating precursor is an acrylate resin, an epoxy nitrile resin, or an organopolysiloxane.
5. Claim 39 is drawn to an insulated fuel cell plate comprising a plate and a coating precursor, where the coating precursor comprises an acrylated aliphatic urethane oligomer, an acrylated epoxy oligomer, a mono-functional monomer, a multi-functional monomer, an adhesion promoter, and a photoinitiator.
6. Claim 46 is drawn to a UV-curable coating precursor comprising an acrylated aliphatic urethane oligomer, an acrylated epoxy oligomer, a mono-functional monomer, a multi-functional monomer, an adhesion promoter, and a photoinitiator.

7. Claim 53 is drawn to a UV-curable coating precursor, where the coating precursor comprises the components in claim 46 in specified amounts.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

9. Claims 1, 3, 5-11, 14-17, 22-30, and 33-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Ying et al.
10. Ying discloses a protective coating for separators in electrochemical cells, where a protective coating is applied to a microporous layer (abstract). The coating may be coated and cured by heat, UV light, visible light, infrared radiation, and electron beam radiation (col. 7 lines 48-55), and the separators may be used in fuel cell applications (col. 11 lines 9-15). Ying teaches combining an ethoxylated diacrylate with a urethane

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acrylate and a photosensitizer, coating the mixture at a thickness of 4 microns onto a substrate, and exposing the coating to UV lamps for 30 seconds to cure (example 1). Since the microporous layers are thin layers of metal oxide material (col. 19 lines 6-17), it is the examiner's position that the microporous layers of Ying's invention would read on a "plate". Further, since the separators of the invention are useful in fuel cell applications, it is the examiner's position that Ying's reference teaches fuel cell plates and processes of making.

11. Claims 1, 9-13, and 22-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Sasaki et al.

12. Sasaki discloses sealants for fuel cells which are applied to a porous carbon plate (col. 3 lines 28-32) and heated to cure the sealant layer (embodiment 1). The plates are exposed to radiation for less than 15 seconds, since radiation is not used to cure the sealant layers. Embodiment 1 shows a coating thickness of 0.25 mm (250 μ m), thus teaching a coating precursor of *less than about* 250 μ m.

13. Claims 46-47 and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by Shustack.

14. Shustack discloses ultraviolet radiation-curable coating precursor compositions comprising 15-75% by weight of a bulky monomer, a urethane (meth)acrylate oligomer, an epoxy (meth)acrylate oligomer, and about 0.1-10% by weight of an adhesion promoter (col. 2 lines 44-69). A preferred bulky monomer is mono-functional isobornyl

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acrylate (col. 5 line 66-col. 6 line 4), and several aliphatic acrylated urethane oligomers are noted for use in the invention (col. 6 line 40-col. 7 line 23). Multi-functional monomers such as glycerol propoxy triacrylate can be included (col. 12 lines 11-21). Photoinitiators are added when UV-curing is desired in an amount of 0.3-10% by weight of the coating composition (col. 9 lines 41-50).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 2-4, 6, 14, 17-19, 21, 24-25, 28-36, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al. in view of Boldt. Boldt (USPN 5,667,227) can be found on the applicant's Form PTO-1449.

17. Sasaki applies as above for the coated fuel cell plate and process of coating a fuel cell plate. However, the reference does not teach the applicant's claimed steps of screen printing and exposing the plate to at least two different wavelengths. Boldt teaches a method and composition for coating a gasket with a composition for providing improved sealing characteristics and storage life (col. 4 lines 37-44; col. 2 lines 19-24), where the coatings are screen printed (col. 1 lines 41-48) and exposed to two different ultraviolet wavelengths (col. 1 lines 63-66). Examples show a total cure time of 1.5 seconds (example 1). One coating composition comprises a urethane acrylic oligomer

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(acrylated oligomer), isobornyl acrylate monomer (mono-functional monomer), TMPEOTA (multi-functional monomer), polydimethylsiloxane (air-release agent), and a benzophenone/1-phenyl-1-2-hydroxy-2-methyl-1-propanone photoinitiator blend (example 5). Coating thicknesses are between 0.001 and 0.020 inches (~25-500 μm , col. 9 lines 1-6). Therefore, it is the examiner's position that it would have been prima facie obvious to use the gasket coating in Sasaki's invention to improve the sealing characteristics of the fuel cell plate.

18. Claims 20, 37, 39-40 and 42-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al. in view of Boldt as applied to claims 2-4, 6, 14, 17-19, 21, 24-25, 28-36, and 38 above, and further in view of Shustack.

19. Sasaki teaches a coated fuel cell plate and process of coating a fuel cell plate. Boldt teaches a UV-curable coating for a gasket comprising a urethane acrylic oligomer, isobornyl acrylate monomer, a multi-functional monomer, a polydimethylsiloxane air release agent, and a benzophenone/1-phenyl-1-2-hydroxy-2-methyl-1-propanone photoinitiator blend (example 5). Boldt also notes that aliphatic urethane acrylic oligomers or epoxy nitrile acrylic oligomers can be added to the coating composition to improve coating flexibility and resistance to fluids. However, the references do not mention the use of both aliphatic acrylic oligomers and epoxy acrylic oligomers in the invention or the use of adhesion promoters. Shustack teaches a UV-curable coating combining urethane acrylic oligomers, epoxy acrylic oligomers, bulky mono-functional monomers, and adhesion promoters to form extensible coatings. Both acrylated

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urethane oligomers and epoxy acrylated oligomers are included in the coating to optimize extensibility and abrasion resistance (col. 6 lines 11-25). Furthermore, an adhesion promoter is included to promote compatibility and thus adhesion between the coating and the substrate (col. 8 lines 54-64). Thus, it would have been prima facie obvious to include both aliphatic urethane oligomers and epoxy acrylated oligomers in the invention of Sasaki et al. and Boldt in any amounts necessary to optimize the extensibility and abrasion resistance of the coatings. It also would have been prima facie obvious to include an adhesion promoter in the invention of Sasaki et al. and Boldt in any amount necessary to optimize adhesion between the coatings and substrates of the invention.

20. The Sasaki and Boldt references also do not mention the use of propoxylated glycerol triacrylate monomer as a multi-functional monomer, although triacrylate monomers are noted (col. 3 lines 60-65). Shustack notes the use of glycerol propoxy triacrylate in the invention as a multi-functional monomer compatible with the coating which does not adversely affect the composition (col. 12 lines 11-21). It is the examiner's position that it would have been prima facie obvious to choose glycerol propoxy triacrylate as a multi-functional monomer in the invention of Sasaki and Boldt to provide a multi-functional monomer for the coating that is compatible with the other components and will not adversely affect the resulting coating.

21. Claims 51-52 and 58-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boldt in view of Shustack.

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22. Boldt teaches a UV-curable coating for a gasket comprising a urethane acrylic oligomer, ~29% by weight isobornyl acrylate monomer, ~1.9% by weight of a multi-functional monomer, a polydimethylsiloxane air release agent, and ~5.7% by weight of a benzophenone/1-phenyl-1-2-hydroxy-2-methyl-1-propanone photoinitiator blend (example 5). Boldt also notes that aliphatic urethane acrylic oligomers or epoxy nitrile acrylic oligomers can be added to the coating composition to improve coating flexibility and resistance to fluids. However, the reference does not mention the use of both aliphatic acrylic oligomers and epoxy acrylic oligomers in the invention or the use of adhesion promoters. Shustack teaches a UV-curable coating combining urethane acrylic oligomers, epoxy acrylic oligomers, bulky mono-functional monomers, and adhesion promoters to form extensible coatings. Both acrylated urethane oligomers and epoxy acrylated oligomers are included in the coating to optimize extensibility and abrasion resistance (col. 6 lines 11-25). Furthermore, an adhesion promoter is included to promote compatibility and thus adhesion between the coating and the substrate (col. 8 lines 54-64). Thus, it would have been prima facie obvious to include both aliphatic urethane oligomers and epoxy acrylated oligomers in the invention of Boldt in any amounts necessary to optimize the extensibility and abrasion resistance of the coatings. It also would have been prima facie obvious to include an adhesion promoter in the invention of Boldt in any amount necessary to optimize adhesion between the coatings and substrates of the invention.

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23. Claims 50, 53-54, and 56-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shustack.

24. The reference teaches a broad range of oligomer weight composition, dependent on the desired extensibility and abrasion resistance properties (col. 6 lines 11-33). However, the reference does not teach the applicant's specific claimed weight ratios of the components. It is the examiner's position that it would have been prima facie obvious to use the components in the applicant's claimed ranges to optimize the extensibility and abrasion resistance of the coatings.

25. The reference does not specifically point to a photoinitiator blend of 1-phenyl-2-hydroxy-2-methyl-1-propanone and benzophenone. However, Shustack teaches that cleavage type photoinitiators such as hydroxymethylphenylpropanone and hydrogen abstraction-type photoinitiators such as benzophenone can be used in the invention (col. 9 line 64-col. 10 line 14), where a combination of cleavage-type and hydrogen abstraction-type photoinitiators are used to optimize surface and through cures (col. 10 lines 34-37). Thus, it would have been prima facie obvious to choose a blend of hydroxymethylphenylpropanone and benzophenone for photoinitiators to sufficiently optimize the surface and through curing of the coatings.

Double Patenting

26. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA

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1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

27. Claims 1-2, 5-9 and 14-16 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-4 of copending Application No. 09/708,965 in view of Ying et al. Although the conflicting claims are not identical, they are not patentably distinct from each other because:

28. Copending claim 1 discloses a process for sealing and insulating a fuel cell plate comprising providing a fuel cell plate and applying an infrared radiation- or heat-polymerizable coating precursor to a surface of the plate, and exposing the coating precursor to radiation or heat to initiate polymerization or crosslinking. However, the present claim does not specify infrared radiation or note the crosslinking of polymers; thus, it is broader than the copending claim. First, it is the examiner's position that crosslinking is a form of polymerization and thus would be encompassed by the term "polymerization". Secondly, Ying et al. applies as a reference teaching curable (polymerizable) coatings for fuel cell applications, where ultraviolet light, visible light, infrared radiation, and electron beam radiation are noted as equally beneficial energy sources for curing. Therefore, it is the examiner's position that it would have been prima facie obvious to choose polymers curable by other radiation means and to expose

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the polymers to other radiation sources in the expectancy of equally beneficial results.

Copending claims 2-4 parallel present claims 2 and 9.

Allowable Subject Matter

29. Claims 41, 48, and 55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

30. The closest prior art, Boldt (USPN 5,667,227-A), teaches a coating composition comprising a UV-curable coating for a gasket comprising a urethane acrylic oligomer, isobornyl acrylate monomer, a multi-functional monomer, a polydimethylsiloxane air release agent, and a benzophenone/1-phenyl-1-2-hydroxy-2-methyl-1-propanone photoinitiator blend. However, the reference does not teach the use of both aliphatic acrylated urethane oligomers and epoxy acrylate oligomers or the use of adhesion promoters such as methacrylated polyols. It is the examiner's position, therefore, that the combination of methacrylated polyol adhesion promoters with the applicant's claimed coating precursor components would provide a novel, unobvious step over the prior art.

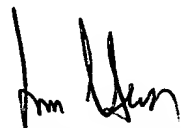
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie Bagwell-Bissett whose telephone number is (703) 308-6539. The examiner can normally be reached on M-F 8-4:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (703) 308-2462. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

mdb
July 8, 2002


James J. Seidleck
Supervisory Patent Examiner
Technology Center 1700